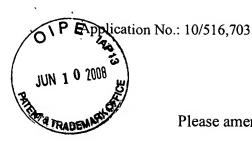
Docket No.: 08228/061001



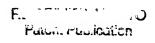
## **AMENDMENTS TO THE CLAIMS**

Please amend the claims as follows.

- 1. (Canceled)
- 2. (Canceled)
- 3. (Previously Presented) A gallium nitride-based compound semiconductor device comprising:
  - a substrate;
  - a first superlattice layer which is formed above the substrate and in which an n-type AlGaN layer and an n-type GaN layer are alternately layered;
  - a multiple quantum well layer which is formed above the first superlattice layer and in which a GaN-based quantum well layer and a GaN-based quantum barrier layer are alternately layered;
  - a second superlattice layer which is formed above the multiple quantum well layer and in which a p-type AlGaN layer and a p-type GaN layer are alternately layered;
  - a buffer layer, a first GaN-based layer which is formed above the buffer layer, and an ntype GaN-based layer which is formed above the first GaN-based layer are provided between the substrate and the first superlattice layer;
  - a second GaN-based layer is provided between the first superlattice layer and the multiple quantum well layer; and
  - a p-type GaN layer is provided above the second superlattice layer;
  - wherein the first GaN-based layer has a structure in which an SiN layer is inserted in a GaN layer, and

the second GaN-based layer has an AlGaN layer.

4. (Previously Presented) A gallium nitride-based compound semiconductor device according to claim 3, wherein

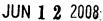


a compositional ratio of Al in the GaN-based quantum barrier layer in the multiple quantum well layer is larger than compositional ratios of Al in the first superlattice layer and the second superlattice layer.

- 5. (Previously Presented) A gallium nitride-based compound semiconductor device according to claim 3, wherein
  - each of compositional ratios of Al in the AlGaN layers in the first superlattice layer and in the second superlattice layer is 5% or greater and 25% or smaller;
  - a compositional ratio of In in the InGaN quantum well layer or the AlInGaN quantum well layer in the multiple quantum well layer is 3% or greater and 20% or smaller;
  - a compositional ratio of Al in the AlGaN quantum barrier layer or the AlInGaN quantum barrier layer in the multiple quantum well layer is 1% or greater and 30% or smaller; and
  - a band gap of the quantum well layer is smaller than a band gap of the quantum barrier layer.
- 6. (Previously Presented) A gallium nitride-based compound semiconductor device according to claim 3, wherein
  - each of thicknesses of the AlGaN layer and the GaN layer in the first superlattice layer is 1 nm or greater and 10 nm or smaller;
  - a thickness of the quantum well layer in the multiple quantum well layer is 1 nm or greater and 5 nm or smaller;
  - a thickness of the quantum barrier layer in the multiple quantum well layer is 2 nm or greater and 50 nm or smaller;
  - a thickness of the AlGaN layer in the second superlattice layer is 0.5 nm or greater and 10 nm or smaller; and
  - a thickness of the GaN layer in the second super lattice layer is 0.5 nm or greater and 5 nm or smaller.
- 7. (Previously Presented) A gallium nitride-based compound semiconductor device according to claim 3, wherein







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a thickness of the first GaN-based layer is 500 nm or greater and 3000 nm or smaller; a thickness of the n-type GaN-based layer is 500 nm or greater and 10000 nm or smaller; each of thicknesses of the AlGaN layer and the GaN layer in the first superlattice layer is 1 nm or greater and 10 nm or smaller;

- a thickness of the second GaN-based layer is 5 nm or greater and 100 nm or smaller;
- a thickness of the quantum well layer in the multiple quantum well layer is 1 nm or greater and 5 nm or smaller;
- a thickness of the quantum barrier layer in the multiple quantum well layer is 2 nm or greater and 50 nm or smaller;
- a thickness of the AlGaN layer in the second superlattice layer is 0.5 nm or greater and 10 nm or smaller;
- a thickness of the GaN layer in the second superlattice layer is 0.5 nm or greater and 5 nm or smaller; and
- a thickness of the p-type GaN-based layer is 5 nm or greater and 50 nm or smaller.
- 8. (Previously Presented) A gallium nitride-based compound semiconductor device according to claim 3, wherein
  - each of thicknesses of the AlGaN layer and the GaN layer in the first superlattice layer is 1.5 nm or greater and 5 nm or smaller;
  - a thickness of the quantum well layer in the multiple quantum well layer is 1 nm or greater and 2 nm or smaller;
  - a thickness of the quantum barrier layer in the multiple quantum well layer is 6 nm or greater and 20 nm or smaller;
  - a thickness of the AlGaN layer in the second superlattice layer is 1 nm or greater and 6 nm or smaller, and
  - a thickness of the GaN layer in the second superlattice layer is 0.5 nm or greater and 3 nm or smaller.
- 9. (Previously Presented) A gallium nitride-based compound semiconductor device according to claim 3, wherein
  - a thickness of the first GaN-based layer is 1500 nm or greater and 3000 nm or smaller;

a thickness of the n-type GaN-based layer is 1000 nm or greater and 2000 nm or smaller; each of thicknesses of the AlGaN layer and the GaN layer in the first superlattice layer is 1.5 nm or greater and 5 nm or smaller;

- a thickness of the second GaN-based layer is 20 nm or greater and 40 nm or smaller;
- a thickness of the quantum well layer in the multiple quantum well layer is 1 nm or greater and 2 nm or smaller;
- a thickness of the quantum barrier layer in the multiple quantum well layer is 6 nm or greater and 20 nm or smaller;
- a thickness of the AlGaN layer in the second superlattice layer is 1 nm or greater and 6 nm or smaller;
- a thickness of the GaN layer in the second superlattice layer is 0.5 nm or greater and 3 nm or smaller; and
- a thickness of the p-type GaN-based layer is 10 nm or greater and 40 nm or smaller.

## 10. - 17. (Canceled)

- 18. (Previously Presented) A method for manufacturing a gallium nitride-based compoundsemiconductor device according to claim 3, wherein
  - the buffer layer is formed on the substrate at a temperature of 450° C or higher and 600° C or lower;
  - the first GaN-based layer, the n-type GaN-based layer, and the first superlattice layer are sequentially formed on the buffer layer at a temperature of 1050° C or higher and 1100° C or lower;
  - the second GaN-based layer and the multiple quantum well layer are sequentially formed on the first superlattice layer at a temperature of 800° C or higher and 900° C or lower; and
  - the second superlattice layer and the p-type GaN-based layer are sequentially formed on the multiple quantum well layer at a temperature of 950° C or higher and 1025° C or lower.

## 19. (Canceled)

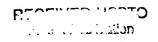
20. (Previously Presented) A gallium nitride-based compound semiconductor device according to claim 3, further comprising:

an n electrode which is connected to the n-type GaN-based layer;

- a p electrode which is connected to the p-type GaN-based layer; and
- a power supply which applies a voltage between the n electrode and the p electrode.

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- 21. (Canceled)
- 22. (Canceled)



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